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EXAMINER

SONG, MATTHEW J

ART UNIT

PAPER NUMBER

1765

DATE MAILED: 08/30/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/728,193

Applicant(s)

MORITA, ETSUO

Examiner

Matthew J Song

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-- Th MAILING DATE of this communication app ars on the cover sheet with the correspondenc address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) 21 and 22 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☐ Claim(s) ____ is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 November 2000 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: .

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of claims 1-20 and 23-24 in Paper No. 3 is acknowledged.
2. Claims 21-22 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in Paper No. 3.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 16-17 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claim 16 recites forming the first pattern by selective deposition of a masking material; the selective deposition of a masking material is not disclosed in the specification.

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 1-20 and 23-24 recites the limitation "the nitride system" in lines 1-2. There is insufficient antecedent basis for this limitation in the claim, likewise for claims 23-24 in line 5.

7. Claims 3-4 recites the limitation "the pitch" in line 3. There is insufficient antecedent basis for this limitation in the claim.

8. Claims 1-20 and 23-24 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 1-20 cites a "predetermined thickness" in line 3 of claim 1, "predetermined" is indefinite, likewise for claims 23-24.

9. Claims 11-20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 11-20 cites a "predetermined base" in line 5 of claim 11, "predetermined" is indefinite.

Claim Rejections - 35 USC § 102

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

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(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

11. Claims 1-2, 7, 11-19 and 23 are rejected under 35 U.S.C. 102(b) as being anticipated by Pribat et al (US 4,952,526).

Pribat et al discloses a wafer 1 made of GaAs or InP (claim 14), this reads on applicant's basal body, depositing a dielectric thin layer 2 of silicon nitride or silica (claim 12-13), where excellent deposition selectivity can be obtained between GaAs and a silicon nitride film by plasma assisted CVD (claim 16-17) (col 10, ln 1-35) with a thickness between 5×10^{-2} and a few micrometers, etching a set of bands 23,24 (claim 2 and 7) on the dielectric using means known to those skilled in the art such as photolithography or wet or dry chemical attack (col 4, ln 50-60), where the bands 23,24 have a width of 0.5 to a few microns and being spaced out at distances of some microns to several hundred microns, thus periodically baring the substrate (col 10, ln 50-67 and col 11, ln 1-10 and Figs 23-24). Pribat et al also discloses a deposition of a thin film of III-V compound is deposited on the preceding structure by MOCVD, with a thickness of a few hundred angstroms to a few microns and depositing a second layer of dielectric, with a thickness of a few hundred angstroms to a few micrometers (col 11, ln 11-38 and Fig 26). Pribat et al also discloses apertures are etched in a second layer of the dielectric and the apertures are offset with respect to the previous ones and the offset can vary from some micrometers to some hundreds of

micrometers, this reads on applicant's forming patterns at least partly overlies one another and at least partly do not overlies one another. Pribat et al also discloses III-V polycrystalline material is removed by chemical attack through the apertures, this reads on applicant's forming an indentation (claim 16-19) so as to bare the monocrystalline seed through the apertures and growing a thin layer of monocrystalline III-V material between the dielectric layers and the upper dielectric is removed throughout the surface of the wafer so as to obtain a monocrystalline thin layer of semiconductor (claim 17) (col 11, ln 39-67 and Fig 27). Pribat et al also discloses repeating the disclosed method to obtain a stacking shown in Fig 14 (claims 16-19) (col 12, ln 1-25 and Figs 22-31). Pribat et al discloses a base layer **32** in Fig 31 (claims 11 and 16-19)

12. Claims 1-2, 7, 11-15 and 23-24 are rejected under 35 U.S.C. 102(e) as being anticipated by Tsuda et al (US 6,294,440).

Tsuda et al discloses a GaN layer **101**, this reads on applicant's base layer, is grown to a thickness of about 4 micrometers on a sapphire substrate **100** (claim 14) is placed in a growth chamber and a first patterned mask made of SiO₂ (claim 12-13) is formed on the GaN layer **101** by sputtering (claim 15) and the SiO₂ film is patterned to a periodic strip with a width of about 7 micrometers and a pitch of about 10 micrometers by conventional photolithography method, whereby a first SiO₂ mask **102** is formed (col 7, ln 20-45). Tsuda et al also discloses a GaN crystal film **103** is grown by Metal organic vapor phase epitaxy (MOVPE) to a thickness of about 3 micrometers and a forming a second mask on the GaN film **103**. Tsuda et al also discloses the second mask film **104** is a SiO₂ film with a thickness of about 200 nm with a periodic strip pattern (claim 2 and 7) with a width of about 8 micrometers and a pitch of about 10

micrometers is formed by a photolithography method and forming a GaN single crystal film **105** thereon by MOVPE (col 7, ln 46-67 and col 8, ln 1-30 and Fig 1). Tsuda et al also discloses it is important to select a relationship between the size of each opening of the first mask and the stripe width of the second mask, depending upon required characteristics of a light-emitting device, this reads on applicant's pitch of pattern elements (col 8, ln 31-65). Tsuda et al also discloses a semiconductor substrate including a sapphire substrate can also be used as a substrate, where a sapphire substrate may be peeled off from a semiconductor structure by grinding or etching and the remaining structure can be used as a substrate (claims 20 and 24) (col 22, ln 2-60).

Referring to claim 1 as interpreted by the examiner, Tsuda et al discloses forming a plurality of pattern in separate positions **102,104** and the patterns partly overlies one another and do not partly overlies one another (Fig 1). Tsuda et al discloses a growth chamber and the deposition of GaN, this reads on applicant's nitride system

Referring to claim 11, Tsuda et al discloses a method of forming layer **101**, the examiner interprets this to read on applicant's predetermined base layer, a first pattern formation **102**, a first growth step **103**, second pattern **104** and second growth step **105**.

Claim Rejections - 35 USC § 103

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

14. Claims 3-4, 20 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pribat et al (US 4,952,526) ~~in view of Tsuda et al (US 6,294,440).~~

Pribat et al discloses all of the limitations of claim 3, as discussed previously in claim 2, except the pitch of pattern elements of one of the plurality of patterns and pitch of pattern elements of another of the plurality of patterns are different from each other.

It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Pribat et al to obtain a different pitch between pattern elements of one and another pattern element by optimizing the pitch of each pattern element by conducting routine experiments of a result effective variable as recognized by the art.

Referring to claim 4, Pribat et al teaches optimizing the pitch of each pattern element, this inherently would satisfy the relationship of claim 4.

15. Claims 3-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsuda et al (US 6,294,440).

Tsuda et al discloses all of the limitations of claim 3-6 including it is important to select a relationship between the size of each opening of the first mask (claim 6) and the stripe width of the second mask, depending upon required characteristics of a light-emitting device, this reads on applicant's pitch of pattern elements (col 8, ln 31-65), as discussed previously in claims 1-2 above, except the pitch of pattern elements of one of the plurality of patterns and pitch of pattern elements of another of the plurality of patterns are different from each other.

It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Tsuda et al to obtain a different pitch between pattern elements of one and another pattern element by optimizing the pitch of each pattern element by conducting routine experiments of a result effective variable as recognized by the art.

Referring to claim 4, Tsuda et al teaches optimizing the pitch of each pattern element, this inherently would satisfy the relationship of claim 4.

16. Claims 3-6 and 8-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pribat et al (US 4,952,526) or Tsuda et al (US 6,294,440) in view of Fleming et al (US 6,358,854).

Pribat et al or Tsuda et al teaches all of the limitations of claim 5, as discussed previously above, except at least one of the plurality of patterns has pattern elements arranged in a plurality of different pitches.

In a method of layered material compositions, Fleming et al teaches a first structured layer 204 comprises a planar pattern of spacer bars 202 of a first material, silica, and rods 205, of a second material, polysilicon, (col 7, ln 1-67) and the first and second material can be selected from III-V semiconductors (col 8, ln 60-67 and col 9, ln 1-20) and features which make a structured layer need not be rectangular bars arranged parallel to each other, but can take on nearly any shape, size (claim 6) and orientation and the size, spacing and separation of elements, this reads on applicant's pitch, making up the structured layers can also vary between layers (col 10, ln 1-30 and col 11, ln 1-10). Fleming et al also discloses a first layer includes a continuous hexagonal distribution of first material, this reads on applicant's two directions (claim 8), the voids of the array being filled with a second material (col 11, ln 11-30 and Fig 6) and a

conventional two-dimensional photonic lattice is implemented with a single structural layer (claim 8), the two-dimensional structure within that layer giving the desired optical properties. (col 12, ln 1-35). It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Pribat et al or Tsuda et al with Fleming's two-dimensional lattice to change the optical properties.

Conclusion

17. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Razeghi et al (US 6,271,104) teaches a buffer layer on a substrate is masked with a dielectric film, which is etched to open periodic seed windows having a width of 0.1-50 micrometers and periods of 0.2-500 micrometers. Razeghi et al also teaches depositing an III-V material in the longitudinal direction from the seed windows and a lateral growth of the same material to form an epitaxial film and a structure, which provides a defect free surface. Razeghi et al also discloses the substrate may be removed by an etching solution to yield a defect free semiconductor material layer for use as a substrate (col 1, ln 40-60 and col 4, ln 35-60).

Scifres et al (US 4,803,691) teaches a GaAs substrate is coated with a photoresist material and channels are etched into the substrate (col 5, ln 1-67 and col 6, ln 1-60 and Figs 3a-d)

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18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew J Song whose telephone number is 703-305-4953. The examiner can normally be reached on M-F 9:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benjamin L Utech can be reached on 703-308-3868. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

MJS
August 27, 2002

Matthew J Song
Examiner
Art Unit 1765



ROBERT KUNEMUND
PRIMARY EXAMINER